

Puget Sound Acquisition & Restoration Fund

Puget Sound Recovery Projects

Application Project Summary

TITLE: Lilliwaup Cr. Reach Asmnt. & Restoration Design			NUMBER: 09-1636N (Non-Capital)
			STATUS: Preapplication
APPLICANT: Long Live the Kings			CONTACT:
COSTS:			SPONSOR MATCH:
	RCO	\$55,200	100 %
	Local	\$0	0 %
	Total	\$55,200	100 %

DESCRIPTION:

The status of Lilliwaup Creek's habitat limits the spawning and rearing success of ESA-listed summer chum (threatened) and other anadromous species. Stream flow, tidal influence, estuarine connectivity, and spawning range are impaired by gravel aggradation in the 0.7 mile anadromous reach. Lack of riparian vegetation contributes to channel instability, reduces contribution of large woody debris, and reduces the amount of shade cover to cool the water and provide fish protection. Unmaintained culverts prevent access to side streams and pools. Upstream of the anadromous reach, steep stream banks may be unstable, threatening to repeat the mass wasting event that brought thousands of yards of gravel downstream into the reach in 2007. The proposed project takes the first step toward restoring and protecting the anadromous reach by creating a *Preliminary Project Design* that identifies sites, methods, and alternatives for restoring: mainstem flows and side-stream connectivity (e.g. aggregated gravel and culvert removal); riparian and in-stream habitat (e.g. re-vegetation, install large woody debris); and the natural tidal influence. Upstream banks will also be assessed and stabilization alternatives proposed. Local residents are concerned about the creek's condition and express interest in seeing it restored. Over 16 years and several hundred thousand dollars in supplementation efforts to recover the Lilliwaup summer chum population are at risk if these issues are not addressed.

LOCATION INFORMATION:

COUNTY:

GOAL & OBJECTIVE:

The goal of the project is to increase/improve information to help select projects that have a high certainty and benefit.

The objective of the project is to determine feasibility of creating or reconnecting off-channel habitat.

The goal of the project is to increase/improve information to help select projects that have a high certainty and benefit.

The objective of the project is to determine project siting, feasibility, design, or implementation.

PERMITS ANTICIPATED:

None - No permits Required

SALMON INFORMATION: (* indicates primary)

Species Targeted

Chinook

Chum*

Coho

Pink

Searun Cutthroat

Steelhead

Habitat Factors Addressed

Biological Processes

Channel Conditions*

Estuarine and Nearshore Habitat

Loss of Access to Spawning and Rearing Habitat

Riparian Conditions

Streambed Sediment Conditions

LAST UPDATED: June 25, 2009

DATE PRINTED: June 26, 2009

Non Capital Cost Estimate Summary

Long Live the Kings

09-1636 N

Lilliwaup Cr. Reach Asmnt. & Restoration Design

Puget Sound Acq. & Restoration

Element/Item	Unit	Quantity	Unit Cost	Total Cost	Description Needed	Description
Worksite #1, Lilliwaup Creek						
Professional Services						
Consultant(s)	Lump sum	1.00	\$36,600.00	\$36,600.00	Optional	Geotechnical engineer, land surveyor, biologist/habitat asse
Rentals & Leases						
Rentals & leases - other	Lump sum	1.00	\$3,000.00	\$3,000.00	Describe	helicopter rental for aerial survey
Salaries & Benefits						
Salaries & Benefits - other	# of FTE's	1.00	\$15,000.00	\$15,000.00	Title	project manager, field crew, admin, etc
Transportation/Travel						
Transportation/travel - other	Lump sum	1.00	\$600.00	\$600.00	Describe	mileage or fuel (vehicle dependent)
Project Tax Amount				\$0.00		
Project A&E Amount				\$0.00		
Project Total Costs				\$55,200.00		

LILLIWAUP CREEK RESTORATION AND BANK STABILIZATION PLAN: ASSESSMENT, FEASIBILITY STUDY, AND PRELIMINARY PROJECT DESIGN

Non-Capital Cost Estimate Summary

Long Live the Kings

Item	Cost	Description
Project Management and Communications	\$11,000	Project management, administration, communication (materials development, distribution, etc.), landowner consultations
Field Support	\$4,000	Staff support for contractor activities
Specialty Services	\$3,000	Helicopter rental for aerial bank and slope stability survey
Professional Services		
Geotechnical Engineer	\$25,000	Land survey and stability assessment, hydrologic analysis, project design
Biologist, Habitat Assessor	\$5,000	In-stream and riparian survey, habitat assessment
Land Surveyor	\$5,000	Land survey
Construction Specialist	\$1,000	Project design consultation
Travel/Transportation	\$600	Mileage
Total Cost Estimate	\$54,600	

[LILLIWAUP CREEK RESTORATION AND BANK STABILIZATION: ASSESSMENT, FEASIBILITY STUDY, AND PRELIMINARY PROJECT DESIGN]

PROJECT PROPOSAL – NON-CAPITAL PROJECTS AND COMBINATION PLANNING/ACQUISITION PROJECTS (EXCLUDING BARRIER INVENTORIES)

INSTRUCTIONS: Salmon Recovery Funding Board applicants must respond to the following items. Please respond to each question individually -- do not summarize your answers collectively in essay format. Local citizen and technical advisory groups will use this information to evaluate your project. Contact your lead entity for additional information that may be required. Limit your response to eight pages.

Submit information via PRISM attachment process. Application checklists and attachment forms may be downloaded off the SRFB Web site at <http://www.rco.wa.gov/srfb/docs.htm>.

PROJECT OVERVIEW

Explain your project overall and include the following elements:

- a) List your primary project objectives, such as how this project will contribute to understanding or restoring salmonids within the ecosystem. For example, the objectives might be to characterize the extent and nature of a certain factor limiting salmonid productivity, identify sources that contribute to the problem and prioritize restoration and management activities to address the problem; to assess landowner willingness to participate in a future land acquisition or restoration project; or to determine project location, feasibility, and design.

The primary objectives of the project are:

- Conduct a reach assessment, feasibility study, and preliminary project design to establish a habitat restoration plan that addresses factors limiting the spawning and rearing success of listed Lilliwaup Creek summer chum and other anadromous species native to Lilliwaup creek (fall Chinook, coho, fall chum, pink salmon, steelhead, and coastal cutthroat trout). This work will confirm existing and/or identify new sites for restoring: mainstem and side-stream connectivity (e.g. aggregated gravel and culvert removal); riparian and in-stream habitat (e.g. bank vegetation and large woody debris); and the natural tidal influence in the anadromous reach of Lilliwaup Creek, from the barrier falls to the mouth of the estuary (approximately 0.7 miles).
- Conduct a reach assessment, and, if needed, a feasibility study, and preliminary project design to stabilize bank and upland areas of the Lilliwaup Creek watershed, above and within the anadromous reach, and along two unnamed tributary streams of the anadromous reach. Bank stabilization may be needed to address critical areas compromised by the December 2007 flood and sediment mass wasting event, and to ensure that downstream restoration work is not compromised in future years.
- The feasibility study will also serve as a platform to assess landowner willingness to participate in this and future restoration projects.

- b) State the nature, source, and extent of the problem or gap in knowledge that the project will address, including the primary causes of the problem, not just the symptoms. Explain how achieving the project objectives will help solve the problem. For fish passage design/feasibility studies, concisely describe the passage problem (outfall, velocity, slope, etc); the current barrier (age, material, shape,

and condition); whether it is a complete or partial barrier; and the amount and quality of habitat to be opened if the barrier is corrected.

Lilliwaup Creek aggradation: Stream flow, tidal influence, and estuarine connectivity have been seriously impaired by gravel aggradation in the anadromous reach of Lilliwaup Creek. In December 2007, abnormally heavy rainfall resulted in flooding and landslides throughout Hood Canal. In Lilliwaup Creek, landslides brought tons of gravel downstream into the anadromous reach from above the barrier falls and from the two unnamed tributaries. An earlier (2005), much smaller “mass wasting” event also contributed to the now excessive accumulation of gravel in the anadromous reach of the watershed. The narrowing of the lower estuary around the 101 bridge is a contributing factor since it limits gravel export from the river into Hood Canal.

Since 2004, the bed of Lilliwaup Creek has raised up to 6 feet in some places. Tidal influence has receded from 350 feet to 1500 feet below the barrier falls. Gravel aggradation also blocks access to several estuary side streams. The most dramatic impact is a 900 foot gravel plug in what was the mainstem channel through the estuary, reducing spawning habitat, limiting upstream fish passage, and contributing to the dramatic reduction in tidal influence. The barrier is of special concern during low summer flows, in September, when ESA-listed summer chum return to spawn in Lilliwaup Creek. The plug would likely be considered a partial barrier since some water still flows over this area during high flows and more extreme high tides, and some creek water has been diverted East through the estuary around the plug.

Side stream access: Access is restricted to four spring fed streams along Lilliwaup Creek, three in the upstream end of the estuary. Gravel and several unmaintained culverts prevent access to over 1,000 feet of stream and over 1 acre of wetland and pond habitat that would be beneficial to juvenile salmonids. The blocked side streams once provided juvenile habitat for Lilliwaup Creek salmonid populations, especially coho, and spawning and rearing habitat for coastal cutthroat.

Bank and upland instability and loss of vegetation: As a result of the 2007 flood event, stream banks and upland areas within and above the anadromous reach may still be unstable. Riparian habitat was eroded and stripped of vegetation. The bases of some older growth trees that stand along the banks in the anadromous reach were buried in gravel, threatening to kill them. The riparian forest in the anadromous reach was already limited prior to the flood event and must be addressed. Channel instability could result in additional mass wasting events. Lack of vegetation in the riparian zone contributes to channel instability, reduces contribution of large woody debris to the system, and reduces the amount of shade cover available to keep water temperatures cool and provide protection to salmonids.

In 2008, LLTK led an effort to perform the initial steps to restore Lilliwaup Creek in the area from the barrier falls to the southern border of the Reed's/Lilliwaup Trust property (the property where Long Live the King's (LLTK) Lilliwaup Hatchery is located). Accumulated gravel was removed, some upland areas were restored and stabilized, and the original course of Lilliwaup Creek was restored. The reach assessment, feasibility study, and subsequent preliminary project design proposed in this application are the first steps to addressing the remaining issues for the “entire” anadromous reach of the watershed, as discussed above.

- c) Describe the fish resources (species and life history stages present, unique populations), the habitat conditions, limiting factors, and historic factors important to understanding this project. Be specific--avoid general statements. Which salmonid species and life cycle stage(s) are targeted to benefit by this project?

Species and associated life-history stages present in Lilliwaup Creek and targeted to benefit from the project:

- Summer chum (ESA listed as *threatened*): upstream migration, spawning, egg incubation, hatching, alevin development, fry emergence and outmigration.
- Fall chum: upstream migration, spawning, egg incubation, hatching, alevin development, fry emergence, and outmigration.
- Coho: upstream migration, spawning, egg incubation, hatching, alevin development, fry emergence, fry rearing and holding, juvenile rearing, and outmigration.
- Fall Chinook (ESA listed as *threatened*): upstream migration, spawning, egg incubation, hatching, alevin development, fry emergence, fry rearing and holding, and outmigration.
- Pink: upstream migration, spawning, egg incubation, hatching, alevin development, fry emergence, fry rearing and holding, and outmigration.
- Steelhead (ESA listed as *threatened*): upstream migration, spawning, egg incubation, hatching, alevin development, fry emergence, fry rearing and holding, juvenile rearing, and outmigration.
- Coastal cutthroat: upstream migration, spawning, egg incubation, hatching, alevin development, fry emergence, fry rearing and holding, juvenile and adult rearing, and outmigration.

Salmonid species in Lilliwaup Creek are unique in that they have adapted to a very short reach heavily influenced by the tides. All species spawn and rear in areas with intruding saltwater. Summer chum, fall chum, coho, and coastal cutthroat are the dominant salmonid species in the watershed. Genetic analyses indicate that Lilliwaup summer chum are significantly different from the other summer chum populations in Hood Canal (Brewer et al. 2005 p. 187¹). Like the other extant populations of summer chum in Hood Canal, the Lilliwaup stock had relatively large adult escapements prior to 1980, followed by severe drops in abundance until the mid to late 90's (Brewer et al. 2005 p. 187). As part of the Hood Canal Summer Chum Initiative, LLTK has been supplementing the Lilliwaup summer chum population since 1998 (limited supplementation occurred prior to 1992, but with little effect on the population). Since supplementation began, the returning adult population of summer chum has increased in abundance from under 100 to over 1,000 annually (supplementation, reduced harvest, and improved ocean conditions may all have contributed to the population increase). Supplementation is slated to end with the final release of hatchery-reared Lilliwaup summer chum in 2010. Please see the response to question b) for information regarding current habitat conditions and its effects on salmon within Lilliwaup Creek.

- d) Describe how this project fits within your regional recovery plan or local lead entity strategy (i.e., Does the assessment fill a data gap identified as a priority in the lead entity's strategy or regional recovery plan? Does the project address a priority action, occur in a priority area, or target priority fish species?).

ESA-listed Hood Canal summer chum, Puget Sound steelhead, and Puget Sound fall Chinook are present in Lilliwaup creek. The Lilliwaup summer chum population is currently of greatest recovery plan priority.

"The Summer Chum Salmon Recovery Plan seeks to maintain current populations structure and distribution of summer chum and restore distribution in previously occupied areas within the species native Range."

-Hood Canal Summer Chum Recovery Plan (Brewer et al. 2005, p. 12)

The Lilliwaup summer chum stock is one of the six core stocks that comprise the Hood Canal summer chum salmon population as identified by the Puget Sound Technical Recovery Team (Brewer et al. 2005, p. 187). The stock has recently been enhanced through supplementation as part

¹ Brewer, S. J. Watson, D. Christensen, R. Brocksmith. November 2005. Hood Canal & Eastern Strait of Juan de Fuca Summer Chum Salmon Recovery Plan. Hood Canal Coordinating Council, Poulsbo, WA.

of the Hood Canal Summer Chum Initiative. The proposed project seeks to restore Lilliwaup Creek habitat so that the supplemented population has the habitat required to be self-sustaining after supplementation ceases. This project applies to both the “Protect” and “Restore” strategy, priorities one and two in the Recovery Plan’s prioritization of strategies (Brewer et al. 2005, p. 31).

“Stock and watershed specific habitat objectives-Lilliwaup Stock: 1) Restore riparian forest in lower river; 2) Protect wetlands in upper Lilliwaup valley; 3) Restore natural tidal channel system”

- Summer Chum Salmon Conservation Initiative- from Table 4.5 (Ames et al. 2000, p.3562)

The proposed project seeks to address at least two of the three objectives (1 and 3) from the Summer Chum Salmon Conservation Initiative by developing a plan to restore riparian vegetation in the lower river and on unstable banks and slopes, and to restore the natural tidal channel system, likely by removing access sediment and restoring channel connectivity. The project will also assess opportunities to stabilize the watershed above the anadromous reach, which may contribute to the protection of wetlands in the upper valley (objective 2) depending upon the extent of the assessment.

“Habitat factors for decline: 1) Loss of channel complexity (large woody debris, channel condition, loss of side channel, channel instability); 2) Altered sediment dynamics; 3) Riparian degradation; 4) Estuarine habitat loss and degradation”

-Hood Canal Summer Chum Recovery Plan- from Table 6.1 (Brewer et al. 2005, p. 76)

The proposed project seeks to address all four of these factors identified in the Hood Canal Summer Chum Recovery Plan. The reach assessment and restoration plan will address lost channel complexity and estuarine habitat by analyzing the potential for sediment removal, culvert removal, and the introduction of large woody debris. The restoration plan will also propose ways to address the degradation of the riparian habitat, likely through stabilization and re-vegetation. A stability assessment and potential slope stabilization plan will attempt to address the increased input of sediments into Lilliwaup Creek’s anadromous reach.

- e) Has any part of this project been previously reviewed and/or funded by the Salmon Recovery Funding Board? If yes, please provide the project name and SRFB project number (or year of application if a project number is not available). If the project was later withdrawn for funding consideration or was not awarded SRFB funding, please describe how the current proposal differs from the original.

No part of this project has been previously reviewed or funded by the SRFB.

When possible, list your sources of information by citing specific studies, reports, and other documents.

2) PROJECT DESIGN

- a) Describe the location of the project in the watershed, including the name of the water body(ies), upper and lower extent of the project (if only a portion of the watershed is targeted), and whether the project occurs in the nearshore, estuary, main stem, tributary, off channel, or other location.

This project includes an assessment of the entire anadromous reach of Lilliwaup Creek from the barrier falls to the mouth of the estuary (0.7 miles). The area includes the mainstem, estuary, and small tributaries and off channel habitat. Two unnamed tributaries in the upper portion of the

² Ames, J. G. Graves, C. Weller. April 2000. *Summer Chum Salmon Conservation Initiative, An Implementation Plan to Recover Summer Chum Salmon in the Hood Canal and Strait of Juan de Fuca Region.* Washington Department of Fish and Wildlife & Point-No-Point Treaty Tribes, Olympia, WA.

anadromous reach and the mainstem above the barrier falls will also be assessed for critically unstable areas. An aerial survey will define the range to be included upstream in this assessment.

- b) If the project will occur in phases, explain individual sequencing steps and which steps are included in this application.

The anadromous reach and stability assessments will occur first. A feasibility study and preliminary project design will follow. Necessary steps will include habitat and biological surveys and inventories (both ambient in-stream and riparian), aerial surveys, land surveys, a hydrologic analysis, geotechnical review, engineered project plans, and discussions with landowners to determine the feasibility of implementing various intensities of treatment on their land.

- c) Describe what products will be produced (i.e., project deliverables). If a project design will be produced, what stage of project development is proposed (conceptual, preliminary, or final-- refer to Appendix D – Project Development Phases Defined)?

The project will ultimately result in a Preliminary Project Design. An estuarine, riparian and in-stream habitat restoration project design will be produced. Biological consultants will produce a report of the inventory of available and potential habitat, both in-stream and riparian, using stream surveys and GIS/GPS. The land surveyor will produce a cross-sectional representation of the watershed. The geotechnical engineer will produce: a report addressing upstream stabilization issues and risks, a flow analysis (historic versus current); and will complete the overall design for the final project.

- d) Explain how the results of the project will lead directly to habitat restoration projects that benefit salmonids.

After the preliminary project design is complete, LLTK will seek funding to complete the habitat restoration work as proposed in the design, with the goal of completing the restoration work by summer 2012.

- e) ***If your proposal includes a Fish Passage or Screening Design/Feasibility Study:***

- i) Provide the Priority Index (PI) or Screening Priority Index (SPI) number and describe how it was generated (physical survey, reduced sample full survey, expanded threshold determination, or Washington Department of Fish and Wildlife generated [list source, such as a study or inventory]). Refer to the Department of Fish and Wildlife's Fish Passage Barrier and Screening Assessment and Prioritization Manual (<http://wdfw.wa.gov/hab/engineer/fishbarr.htm>) for guidance.

Not applicable.

- ii) For fish passage design projects, identify other fish passage barriers downstream or upstream of this project.

Not applicable.

- f) ***If your proposal includes an Assessment or Inventory (NOTE: project may extend across a wide area and cover multiple properties):***

- i) Describe the assessment or inventory design and methodology.

In-stream and riparian surveys and inventories will be conducted and compiled by biologists. Land surveys will produce cross sectional, elevation maps to determine and quantify risks of upstream tributaries and stabilization issues. Hydrologic analysis will define pre- and post-flood basin wide flow rates. Aerial surveys will inventory the pockets of future stabilization issues and risks to the system.

- ii) Describe any previous or ongoing assessment or inventory work in your project's geographic area.

Following the December 2007 flood, an emergency sediment removal and bank stabilization project was performed on the extent of Lilliwaup Creek from the barrier falls to the southern border of the Reed's/Lilliwaup Trust property (RM 0.7-0.5). A hydrological and habitat assessment for that area was completed as part of the permitting process. Information from these assessments will carry forward to the work being proposed.

- iii) Describe how the assessment or inventory addresses the stages and elements in *Guidance on Watershed Assessment for Salmon* (Joint Natural Resources Cabinet, May 2001, <http://www.digitalarchives.wa.gov/governorlocke/gsro/watershed/watershed.pdf>).

The watershed assessment to be performed will incorporate existing information and work to address any information gaps for the three stages and associated elements identified in the *Guidance* document. Significant data exists regarding stock status and trends, especially for Lilliwaup summer chum (Stage I). LLTK have monitored and observed Lilliwaup Creek fish populations for 15 years and have accumulated substantial knowledge regarding Lilliwaup salmonid life histories and their association with the watershed habitat (Stage III). The habitat and assessment information compiled as part of the summer chum recovery planning process to identify the primary habitat limiting factors for the Lilliwaup summer chum stock are being used, in conjunction with habitat restoration needs resulting from the 2007 flood event, as base level guidance for the assessment and subsequent project design (Stages I and III). LLTK staff and the contractors proposed to work on this project (i.e. Lee Boad, Ron Gold, Ken Martig) also have historical knowledge of the watershed that will contribute to the assessment of the causes of the current habitat conditions and the environmental factors limiting production (Stages I and II). The hydrological and habitat assessments performed as part of the 2008 emergency sediment removal and bank stabilization project will also contribute data. Any remaining data gaps will be filled during the assessment.

3) PROJECT DEVELOPMENT

- a) List the individuals and methods used to identify the project and its location.

Long Live the Kings, in consultation with Richard Brocksmith of the Hood Canal Coordination Council identified the project. The timing is particularly important given the added need to restore the stream after the 2007 flood event and given that the supplementation of Lilliwaup summer chum will soon cease, requiring that the population become self sustaining.

- b) Explain how the project's cost estimates were determined.

LLTK requested estimates from the contractors listed in the budget estimate. LLTK staff time is based upon the assumed number of hours staff needed perform field support, administration, project management and communication activities as indicated in the attached budget.

- c) Describe other approaches and design alternatives that were considered to achieve the project's objectives.

No other approaches have been considered. As a Preliminary Design Project, the proposed work will explore and evaluate various approaches, opportunities, and design alternatives to meet the habitat restoration and bank stabilization objectives of this project.

- d) Describe the consequences of not conducting this project at this time. Consider the current level and imminence of risk to habitat in your discussion.

Over 16 years and hundreds of thousands of dollars in supplementation efforts to recover the ESA-listed Lilliwaup summer chum population are at risk if the anadromous reach habitat is not restored and the critical bank and slope stabilization issues are not addressed. Once supplementation is discontinued (the final release of hatchery-reared summer chum is slated for spring 2010), the summer chum population's dependency upon a healthy freshwater and estuarine habitat for survival

will drastically increase. The current condition of the anadromous reach, especially given the impacts of the December 2007 flood event, is not suitable for the long-term health of the population and will likely not become suitable by any natural processes due to the amount of gravel deposited and since the highway 101 bridge and residential development along the estuary prevent the creek from naturally adapting.

- e) Include a Partner Contribution Form, when required, from each partner outlining its role and contribution to the project. This form may be downloaded off the SRFB Web site. State agencies are required to have a local partner that is independently eligible to be a project sponsor. A Partner Contribution Form is also required from partners providing third-party match.

Not applicable.

- f) List all landowner names. Include a signed Landowner Acknowledgement Form (download off the SRFB Web site) from each landowner acknowledging their property is proposed for SRFB funding consideration. If an assessment covers a large area and encompasses numerous properties, Landowner Acknowledgement Forms are not required. For sponsors proposing feasibility/assessment work on their own property this form is not required. For multi-site acquisition projects involving a relatively large group of landowners, include, at a minimum, signed Landowner Acknowledgement Forms for all known priority parcels.

Landowners include: Lilliwaup Trust (Gary Reed), Wayne and Rose Marshall, Diane Cuzik, Betty Gray, David and Linda Laney, and Stephen Carey.

- g) Describe your experience managing this type of project. List the names, qualifications, roles and responsibilities for all known staff, consultants, and subcontractors who will be designing and implementing the project. If unknown, describe the selection process.

Long Live the Kings (LLTK): Project administration, management, communications, community outreach, and field support (e.g. assist senior biologist and geotechnical engineer with creek and upland surveys). Staff includes Rick Endicott (Lilliwaup Hatchery Manager), Joy Waltermire (Steelhead Biologist), Michael Schmidt (Director of Fish Programs), and Jed Moore (Assistant to Director of Fish Programs). LLTK staff have been managing and implementing salmon recovery projects for over 20 years, with 15 years experience in the Hood Canal region. Although our primary focus has been on salmon management, policy, and supplementation projects (e.g. Hamma Hamma and Hood Canal Steelhead Projects, Hamma Chinook Conservancy Site Project), LLTK led efforts to establish off-channel habitat in the Chehalis Basin, most notably on the property of WDFW's Wishkah Hatchery (operated by LLTK from 1986-2007). We also led the 2007 flood-related emergency habitat restoration work performed on Lilliwaup Creek in 2008. LLTK staff operated Lilliwaup Hatchery on Lilliwaup Creek since 1994 and have been involved in supplementing the Lilliwaup summer chum population and monitoring the other Lilliwaup salmonid populations since that time, acquiring vast knowledge about the watershed.

Ken Martig, Martig Engineering, Geotechnical Engineer: Conduct risk-benefit assessment of slope stability, and design stabilization measures, if needed. Complete a hydrologic analysis of the watershed and conduct land surveys in the anadromous reach, and upstream as necessary. Create and design the restoration projects work plan and design, consulting with cooperating contractors and consultants. Ken has been involved in enhancement engineering projects for salmon, habitat since the early 1970's. Ken was also the engineer for the emergency restoration work performed in Lilliwaup Creek in 2008.

Lee Boad, Wetland Corps, Senior Biologist: Conduct in-stream ambient monitoring surveys and inventory, riparian inventory, and invasive species inventory. Assess and quantify available and potential salmonid spawning and rearing habitat. Recommend riparian habitat improvements. Lee has extensive experience with habitat restoration projects in Hood Canal and comes recommended by the Hood Canal Coordinating Council.

Rich Norris, Forest Land Surveys, Licensed Land Surveyor. Conduct land surveys and create cross-sectional, elevation maps.

Ron Gold, R.G. Forestry, Contractor, Construction specialist, with extensive in-stream and riparian restoration experience in the Hood Canal region: Contribute his expertise and experience to discussions regarding the feasibility of prospective project elements and project strategies. Ron completed the work performed on Lilliwaup Creek in the summer of 2008 and is familiar with the current and historic characteristics of the watershed

4) TASKS AND SCHEDULE

List and describe the major tasks and time schedule you will use to complete the project. Non Capital projects should be completed within two years of funding approval.

The stability and anadromous reach assessments can take place simultaneously and are anticipated to begin in spring 2010. The feasibility analysis, evaluation of options, and completion of the preliminary project design will take place during summer/fall 2010.

5) CONSTRAINTS AND UNCERTAINTIES

Each project should include an adaptive management approach that provides for contingency planning. State any constraints, uncertainties, possible problems, delays, or unanticipated expenses that may hinder completion of the project. Explain how you will address these issues as they arise and their likely impact on the project.

Landowner willingness may be a constraint. To date, all of the landowners are interested in investigating the potential for creek and estuary restoration. However, landowner acceptance of restoration activities will not be known until design alternatives are drafted. The purpose of scoping this project as an assessment and design project is to fully consider landowner acceptance of certain restoration actions. Landowners will be consulted throughout the course of the project and their feedback will be used in the development of the project design.

The largest uncertainty is the extent to which the watershed banks and slopes upstream of the barrier falls are instable AND correctable. The anadromous reach and two unnamed tributaries to the anadromous reach were informally surveyed in 2008, and any stability issues that may arise in these areas are likely correctable.

Supplemental Questions

6) *PROJECTS INVOLVING ACQUISITIONS (Applies to Combination Projects)– Answer the following questions*

Not applicable.

Anadromous
Barrier

tributary and
pond habitat
access restricted
by gravel and
culverts

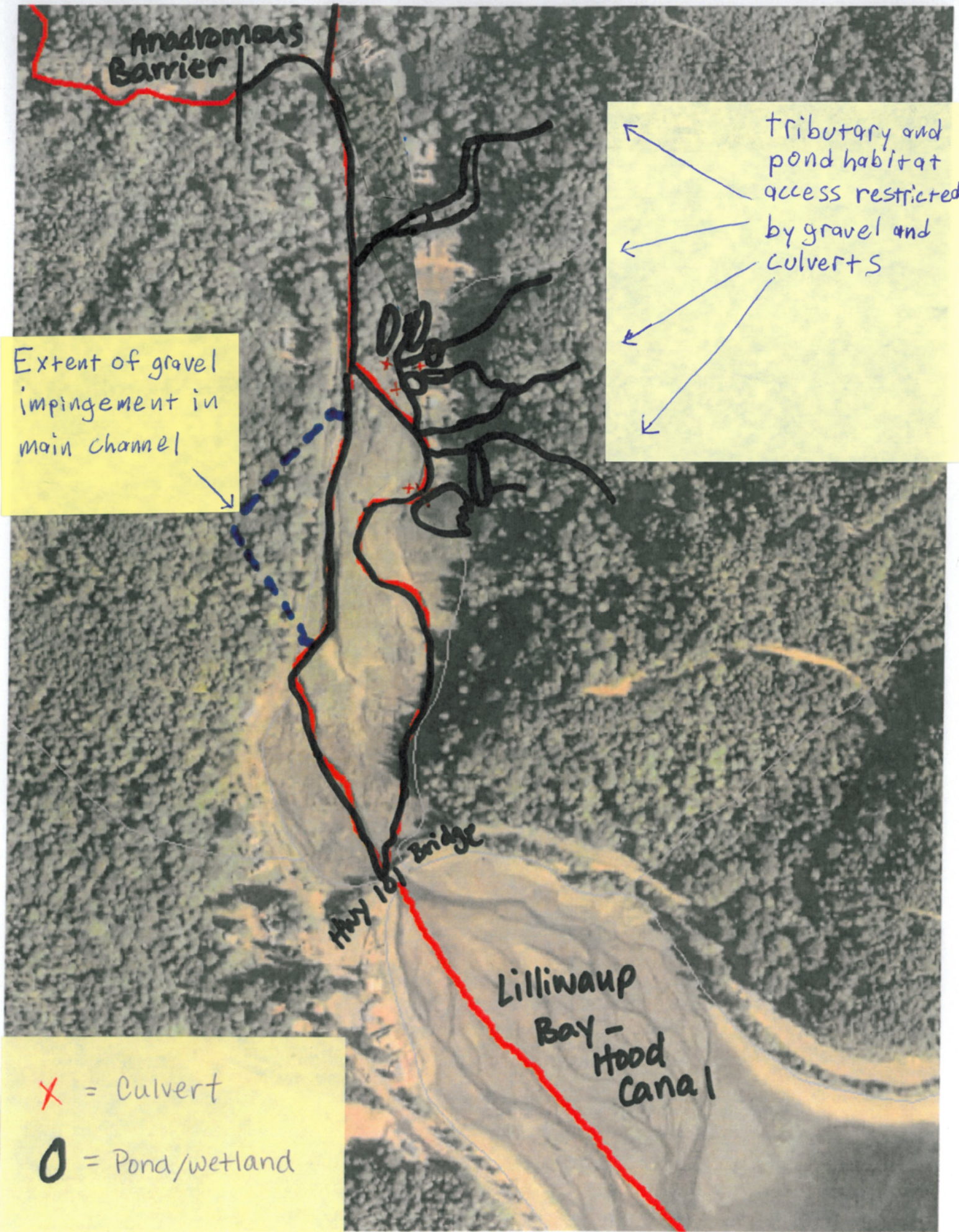
Extent of gravel
impingement in
main channel

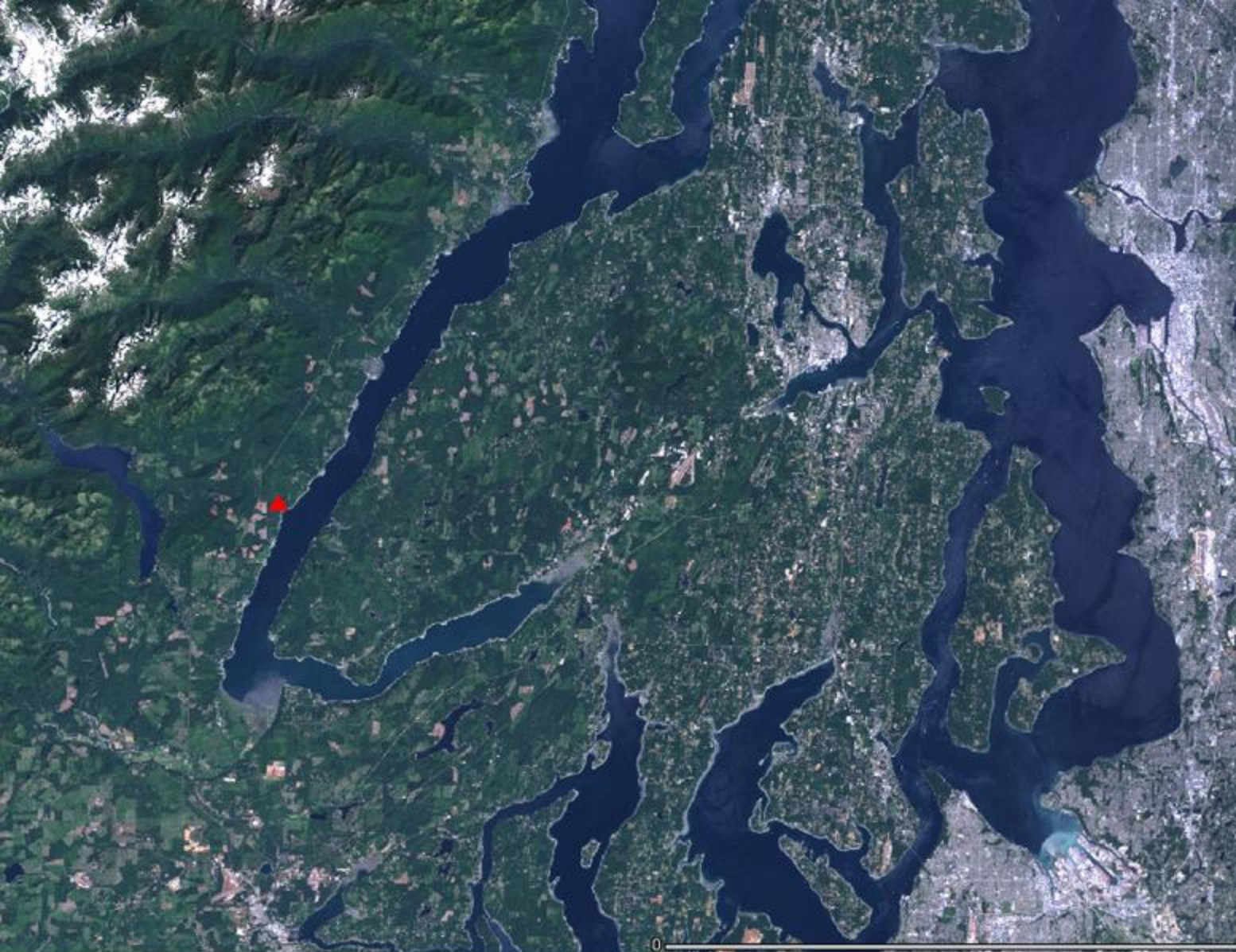
May 101 Bridge

Lillinaup
Bay -
Hood
Canal

X = Culvert

O = Pond/wetland





Long Live the Kings; Lilliwaup Cr. Reach Asmnt. & Restoration Design (#09-1636)

Worksite: #1, Lilliwaup Creek

Attachment #2, Vicinity Map